

# Impact of Contract Farming: Evidence of Small Dairy Farm Households in Mongolia

Tuvshinjargal Dagiimaa

**Abstract**—Since 2014, the Mongolian dairy production has grown rapidly, meanwhile, the need for a stable supply of raw materials also has increased. However, the dairy farm households are the potential suppliers for dairy companies, cannot comply with the higher demand and grading requirements for the supplied products. That is, the spot market has been created vertical coordination problem along the supply chain. So dairy companies initially have changed an organizational form for the supply base and introduced the contract farming (CF) arrangement. CF is defined as an agreement between a contractor (for instance, processor) and one or more farmer (s) for the production and supply of agricultural products under forward agreements. The agreement often includes the provision of production support by the contractor, such as inputs and technical assistance. The analysis focused on the household characteristics associated with participation in CF and the impact of contract participation on annual milk income. The study sampled from the Mongolian small dairy farm households includes contract farmers and independent farmers. The econometric analysis has three estimations. First, I use a probit model to estimate the probability that a given household will participate in CF. Second, I estimate the regression model of income as a function of farm household's characteristics and a dummy variable representing participation in CF by OLS method. Third, to control sample selection bias, I estimate the treatment effects model. The research result found that CF has a positive effect on the milk income through the estimation both of the ordinary regression model and the Heckman's selection-correction model. However, the former estimation underestimated this effect and there was the effect of an unobservable variable. In addition, the critical view that dairy company not only excludes small farms from CF but also contracts with a few large-scale farms was not supported. Finally, the hypothesis that the household with relatively intensive dairy farm due to the perishable nature of milk choose CF to reduces transaction costs based on Transaction cost economics was supported.

**Index Terms**—Contract farming, the Mongolian dairy industry, the Heckman correction.

## I. INTRODUCTION

Since 1990s, the supply chain of the developing countries where the agri-food industry increased rapidly, has been faced vertical coordination problem, then has changed an institutional form of coordination [1]. That is, a meta trend including urbanization, globalization, liberalization and rising issue about safety food has fostered consolidation, multi-nationalization, specialization (e.g. large-scale processors, exporters) as well as has increased the supply

base of high-quality raw materials. But many farms and smallholders of the developing countries faced to market constraints related to access finance and essential inputs (feed, fertilizer, seeds, capital, etc.). Consequently, agribusiness firms such as processor could not find the desired raw materials from open market and the vertical coordination problem has been evolved in the agrifood chain. To overcome the coordination problem, there is a tendency for those countries to choose a broader contractual relationship rather than vertical integration along the chain [2]. This coordination form is called the contract farming. CF is defined as an agreement between a contractor (for instance, processor) and one or more farmer (s) for the production and supply of agricultural products [3]. The agreement often includes the provision of production support by the contractor, such as inputs and technical assistance.

Recent research emphasizes the importance of institutional structure for economic development and CF is an important aspect of agricultural institutions that attracts the attention of researchers, policy makers, and donors [4], [5]. As a reason supporting CF, small farms have the opportunity to overcome market constrains through the strategic advantages of the large-scale processor [6]. In particular, agribusiness firms are instrumental in opening markets for smallholders where high transaction costs effectively prevent smallholder access because these firms have advantages over smallholders in market knowledge and experience, information links, legal expertise. Agribusiness firms also have lent relatively inexpensive credit to smallholders through CF where, for a range of reason, they face high interest rates or have no access. Therefore, CF has socio-economic benefits by connecting smallholders to the supply chain, increasing productivity and income, and reducing poverty. For instance, the review study of CF in developing countries found recently that estimated increase in income for CF over the average income non-contract farming smallholders ranges from 25 percent to 75 percent [7]. At the same time there is a critical view that smallholders are excluded from the supply chain and the benefits of contracting [8].

The objective of this paper is to study the impact of contract farming on the small farm households for Mongolia. Our empirical analysis uses data from dairy farm households which are potential suppliers to dairy companies. I selected the Mongolian dairy sector for following reasons. First, the dairy industry has been severely affected by the economic and institutional reforms during the transition. It produced almost 60 million liters of dairy products in 1990, at beginning of the transition then dropped to around 2 million liters in 1995. However, the decline in production stopped and has turned since an early year of 2000s. Moreover, the level of production reached 135 million liters in 2018, has increased

Manuscript received May 17, 2021; revised July 29, 2021.

The author is with the University of Finance and Economics, Ulaanbaatar, Mongolia (e-mail: tuvshinjargal.d@ufe.edu.mn).

eight times during last ten years. In particular, since 2014, a new development has emerged that the industry not only has attracted significant investments for both technological innovation and processing plants, but also restructured to concentrate on few large-scale processors. Second, the most of dairy farms are smallholders, based on the privatization of the mechanized farms with the 800 cows under the socialist system. For instance, farms with fewer than 10 cows had 60% of the total sampled farms in a main milk production region [9]. However, they cannot become a stable supplier of dairy companies because in winter season, their milk production drops sharply due to low productivity, the lack of farming equipment and imperfect inputs markets. Therefore, it has led to a shortage of supply base for dairy companies. This issue has been exacerbated by the government imposing a quota on the dried milk imports since 2013. Third, in response, as has been the case in other developing countries, dairy companies have become more focused on a supply chain management or vertical coordination. This is evidenced by the fact that two dairy companies which have dramatically increased their production capacity, have been implementing the contract farming (CF) since 2017. The CF includes the provision of physical inputs, credit and prompt payment. Finally, in the term of contract farming research, from a recently review study of CF in developing countries not only for milk but also other agricultural products have not been studied in Mongolia yet [10]. Therefore, there is a research gap that will investigate the impact of CF established by the dairy companies for a sustainable supply of raw materials in Mongolia.

The paper is structured as follows. In Section II, I review previous research that evaluates the effect of CF, as well as it is defined as an institutional arrangement to overcome the high transaction costs in spot market. Section III describes the farm survey data and the econometric methods in this study. Section IV provides the results of in two parts: a comparison of contract and non-contract farmers, and an econometric analysis of contract participation and income. Final section provides some conclusion.

## II. LITERATURE REVIEW

Spot markets in developing countries can be seen as the default marketing option for small rural farmers. But there is a difference between the theoretical definition of spot markets and spot markets that exist in many developing countries. That is, evidence in Africa suggests that input and output markets (e.g., labor or credit) are beset with problems of moral hazard, adverse selection, and contract enforcement problems that shape economic exchange and determine, and thereby increase transaction costs [11]. A similar result can be seen in the influence of Lecofruit, a company that buys vegetables from small rural farms in Madagascar on a contract basis and exports them to European supermarkets. As to get at the benefits of the contract with the firm, a willingness-to-accept question was asked on the level of the price gap between the local market and the contract at which the contract farmers would refuse contract and even if prices set by the firm would be half the prices that are observed on the local market, almost half of the contract farmers would still stick to the contract of the firm. This behavior seems to

be explained by high transaction costs in local agricultural marketing [12]. Furthermore, a study of Indian dairy farms found that the share of transaction cost in total cost for contract farmers was only 2 percent, compared to 20 percent for non-contract farmers [13].

The common theoretical explanation is based on transaction cost economics (TCE). This theory explains how economic actors choose the governance structure from a set of feasible institutional alternatives that safeguards their transaction at the lower costs [14]. And asset specificity which refers to investments specifically made for the bilateral relationship and whose value is substantially lower outside the relationship, is generally considered to be the most important transaction characteristic that would favor CF over a spot market arrangement. When producers, at the time of deciding on the type of product and the investments needed, do not have any guarantee on beneficial market condition, they are not likely investing in specific (e.g., high-value-cost) crops. Any processor that would like to source specific crops from farmers will have to provide some pre-planting guarantee to these farmers that will purchase the harvest. In order to safeguard this investment, the processor will enter into a contract with the producers to have a guaranteed supply of raw material. This prediction of TCE was analyzed by [15] in a study of a Polish dairy farm. The results of the study show that both credit and inputs provided by dairies have a positive and highly significant effect on investment by dairy farms. In addition, for dairy-specific investments (e.g., upgrading the livestock herd, buying cooling tank) both credit and inputs provision have the same effect as before, and the bank loan guarantee significantly increase the probability of investing.

Since the 2000s, empirical studies determine the impact of CF on the income and efficiency of supplier households, have been used widely the Heckman's selection-correction model, IV, and PSM methods. To measure the benefit of participating in CF it is necessary to take in account the fact that individuals that participate might have earned a higher income even if they had not participated. That is, there may be unobservable factors (entrepreneurial skills, management ability, social network, etc.) that increase the likelihood participating in CF and increase income. When this is case, the impact of CF would be overestimated by simply regressing income on a dichotomous variable that indicates participation in CF. The Heckman's method estimates the average treatment effect with reflecting the effect of the unobserved variable. In the case of Senegal, the effect of CF on the income of the supplier household was first determined by the Heckman's method and result in an increase in gross agricultural income of 39% [16]. In the case of Polish dairy farms, dairies that provide more programs to their supplier have few suppliers dropping out, and their supplier grow more over the five years after the introduction of CF by Polish dairies [17]. In addition, the Indian dairy farm study found that CF was significantly lower in transaction costs than the direct market and supply to wholesalers, in particular, for a small farm, it is three times smaller than for a similar farm supplied directly to the market, and CF have increased the net income of supplier households by 80% according to Hackman's estimation [13].

An established trend in developed countries is that farmers with large-scale farms are more likely to engage in CF. In the

United States, farmers with an annual income of more than 500,000 USD have a higher chance of applying for CF, with the highest percentage of contract farmers [18]. Moreover, in developing countries, the variable of farm size to participation in CF has been positive and statistically significant in most studies. In particular, there is empirical evidence that only large-scale farms export high-value crops from in Kenya [19], Senegal [20] and Mexico [21]. In addition, a review study of CF in developing countries by [4] found that even though there were positive, negative, and statistically insignificant results in farm size, most studies support the common position that processors contract with a small number of large-scale farms in order to reduce transaction costs. This judgement also is linked to the level of agroindustrialization in the country, with small farms could contract with processors and supermarkets, known as modern sales channels, in countries where agroindustrialization is at an early stage. However, as industrialization intensifies, there is the excluding effect from the chain [22].

### III. DATA AND METHODS

This study is based on a primary survey of small dairy farm households. The survey was conducted during May and June 2019 in two soums of Tuv aimag and two districts of capital city, namely Ulaanbaatar, which the territory of Mongolia is administratively divided into 21 aimags and capital city, aimag into soums, the capital city into districts. I surveyed 44 contract farmers and 100 non-contract farmers. The contract farmers were selected randomly from lists provided by two dairy companies. The non-contract farmers were selected randomly from lists provided by leaders of local territorial units. The 6-page farmer questionnaire includes questions on household characteristics, assets, milk income for 2018. The analysis focuses on the household characteristics associated with participation in CF and the impact of contract participation on annual milk income. The household characteristics are divided by demographic and economic factor. The demographic factor includes age of head, sex of head, education of head, household members, as well as the economic factor includes farm size, farmer experience, family labor and credit constraints. To address the participation in CF, the paper also considers the prediction of TCE that the perishable nature of raw milk creates the temporal asset specificity, would be favor CF over a spot market. A number of case studies illustrate the connection between perishability and the hold-up problems. Accordingly, it is not surprising that sales of raw milk to milk processors are typically governed under long-term contracts. However, I propose that the farmer with more intensive farming has the higher level temporal asset specificity and so the higher probability selecting CF. Therefore, the level of temporal asset specificity is measured by the number of a well-bred cow, hired labor and electric milker based on [23]'s study.

The econometric analysis has three steps. First, I use a probit model to estimate the probability that a given household will participate in CF. The regressors include household's demographic and economic characteristics and the asset specificity. This analysis investigates the question of whether contract farmers tend to be better endowed than non-contract farmers or to prevent the hold-up problem is related

to the temporal asset specificity. Second, I use an ordinary least squares (OLS) model to estimate income as a function of farm household's characteristics and a dummy variable representing participation in CF. However, this model does not take into account possible selection bias in contract participation. If contract farmers tend to be more skilled than non-contract farmers, for example, they would have higher incomes regardless of whether they participated in CF. In this case, the coefficient on the participation dummy variable would include the effect of these unobservable characteristics in addition to the effect of contracting, thus over-estimating the effect of contracting. Third, to control this sample selection bias, I use the treatment effects model (also called the Heckman selection-correction model). That is,

$$Y_i = \beta X_i + \delta I_i + u_i \quad (1)$$

$$I_i^* = \alpha Z_i + e_i \quad (2)$$

$I_i = 1$  if  $I_i^* > 0$ , otherwise  $I_i = 0$ , where  $Y_i$  is the income,  $X_i$  variables through affect income,  $I_i$  dummy variable for CF participation, and  $Z_i$  the variables determining participation. Note that we cannot simply estimate (1) because the decision to participate may be determined by unobservable variables that may also affect income. If this is the case, the error terms in (1) and (2) will be correlated, leading to biased estimates of  $\delta$ , the impact of contracting on income. We can correct for the selection bias by assuming a joint normal error distribution, and using a two-step procedure. In the first step, I use a probit model to estimate program participation. Using the probit results, I compute the inverse Mill's ratio for each observation. In the second step, I linearly regress income on the explanatory variables and the inverse Mill's ratio. This term corrects for possible selection bias and yields unbiased and consistent estimates in the income model. Identification is provided by the inclusion of a variable in the selection model that is not found in the outcome equation. Our identifying variable is the distance of farm household from the nearest paved road.

### IV. ECONOMETRIC ANALYSIS

#### a) Comparison of contract and non-contract farmers

The characteristics of contract and independent farmers are shown in Table 1. The average household has 4.2, the average age of the heads of households is 46.6, the average score of schooling of the heads of households is 2.2, which represents between high school and technical and vocational education, and the average farming experience of the heads is 12.3 years. Moreover, around 2 members of household on average work on farming, the 40% of households has bank loan and the distance to paved road is 6.5 km. The 28% of the well-bred cows indicates the lower productivity of the households. But there seems to be no significant difference in sex, education and household size, family labor working for farm, access to credit, farming experience, the distance to paved road, cooperatives and percentage of the well-bred cow. Despite above, there are differences in age of head, farm size, hiring labor for farm and usage of electric milker at the 5% level: contract farmers have younger head, the average amounts of cow are larger, they hire more labor for farming than independent farmers. More importantly, contract farmers

have 64% higher income compared to independent farmers, which is statistically significant difference. That is, contract farmers on average had 40,2 million MNT of annual milk income, while independent farmers had 24,5 million MNT of

annual milk income (statistically significant at the 1% level). The MNT is the Mongolian currency and the exchange rate was USD 1 = 2472 MNT by 2018.

TABLE I: CHARACTERISTICS OF CONTRACT AND INDEPENDENT DAIRY FARM HOUSEHOLDS, 2018

Variable	All farmers	Contract farmers	Independent farmers	t test of difference	
				t-stat	Prob
<b>Demographic factors</b>					
Age of head (years)	46.6	44	48	2.19	0.03**
Sex of head (=1 if Male, =0 if Female)	0.9	0.9	0.9	-0.17	0.87
Education of head (=4 if High education, =1 if primary education)	2.2	2.3	2.2	-0.82	0.41
Household size (persons)	4.2	4.2	4.3	0.33	0.74
<b>Economic factors</b>					
Farm size ( number of cows in 2018)	14.9	18.2	13.5	-3.02	0.00***
Family labor for farm (persons)	1.9	1.8	1.9	0.95	0.35
Credit constraint (=1 if access bank loan, =0 if without loan)	0.4	0.4	0.4	-0.10	0.92
Experience (years)	12.3	12.4	12.3	-0.04	0.97
<b>Asset specificity</b>					
Share of the well-bred cow (%)	28%	31%	27%	-0.56	0.57
Electric milker (=1 if Yes, =0 if No)	0.19	0.34	0.13	-3.01	0.00***
Hired labor for farm (=1 if Yes, =0 if No)	0.27	0.5	0.16	-4.84	0.00***
<b>Other factors</b>					
Member of farm cooperation (=1 if Yes, =0 if No)	0.1	0.1	0.1	0.11	0.91
Distance to paved road (km)	6.5	6.1	6.7	0.66	0.51
<b>Income</b>					
Total annual milk income (MNT, million)	29,3	40,2	24,5	-4.29	0.00***
Total income per cow (MNT, million)	2,1	2,7	1,8	-2.68	0.00***

Note: \* Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.  
Source: Sample survey

b) Econometric analysis of participation and its effect on income

The first part of the econometric analysis examines differences in the characteristics of contract and independent farm households for participation in CF by using a probit model estimation. The results, shown in Table II. As expected, having a greater percentage of the well-bred cows increases the probability that a household will participate in the CF. Moreover, the hiring labor for farming is positively associated with contracting. These variables measure the level of temporal asset specificity. It indicates that the household with more farming equipment and hired labor may choose the CF to reduce transaction costs associated with the hold-up problem because they have a large milk production which its value is substantially lower outside the CF due to the perishable commodity. The number of cows represents farm size is positively related to contract participation, but the relationship is insignificant so there is no evidence of excluding against small farm. This fact suggests that small farm households are the potential suppliers for dairy processors, otherwise, they find less likely an alternative source of the supply base. For other variables, the farming experience is weakly related to contract participation, but the age of head is a strong predictor of participation in the CF: households with younger head are significantly more likely to participate. This probably reflect an interest of the dairy processors that increases the number of the contract farmer. Many studies in contract farming consider the distance to the

paved road or collection center as the predictor of participation, but the result was somewhat surprising that this variable was insignificant. The second part of our econometric analysis is an ordinary least squares (OLS) regression of milk income as a function of various household characteristics and a dummy variable representing contract farmers.

TABLE II: PROBIT MODEL OF PARTICIPATION IN CONTRACT FARMING

Variable	Coefficient	S.E.
Dependent variable: Contract participation dummy		
Age of head	-0.048***	0.014
Sex of head	0.630	0.539
Education of head	0.066	0.166
Household size	-0.093	0.096
Farm size	0.010	0.017
Family labor	0.020	0.263
Credit constraint	-0.033	0.270
Experience	0.032*	0.018
Share of well-bred	0.603*	0.309
Electric milker	0.343	0.356
Hired labor	1.200***	0.331
Member of cooperation	0.117	0.392
Constant	0.190	1.058
Distance to paved road	-0.008	0.023
Pseudo R2	0.21	
Number of observations	144	

Note: \* Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

Ideally, our dependent variable would be net milk income. Unfortunately, accurate data on the value of inputs to production are difficult to obtain in this environment. As consequence, I use gross milk income as our dependent variable. Table III presents the results of the model, which explains about 70% of the variance in milk income across the sample. Annual milk income is positively affected by the share of the well-bred cows, farm size, usage of electric milker, and being a contract farmer. The coefficient on the contract variable implies that contracting raises milk income by 4,4 million MNT.

TABLE III: REGRESSION ANALYSIS (OLS) OF MILK INCOME

Variable	Coefficient	S.E.
Dependent variable: Household milk income		
Age of head	-104.30	104.63
Sex of head	309.75	3722.99
Education of head	-896.99	1270.28
Household size	-568.13	707.26
Farm size	1443.71***	146.01
Family labor	1273.00	1921.37
Credit constraint	-2318.85	2110.25
Experience	-74.81	131.91
Share of well-bred	1443.71**	146.01
Electric milker	1273.00***	1921.37
Hired labor	-2318.85*	2110.25
Member of cooperation	-74.81	131.91
Constant	12611.72	7868.65
Contract farming	4475.54*	2389.57
Adjusted R2	0.71	
Number of observations	144	

Note: \* Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

The third of our econometric analysis repeats the estimation of milk income, but, instead of OLS, it uses the treatment effect model, also called the Heckman selection-correction model. As described above, this model involves two equations: the selection equation estimates the probability of participating in CF and the outcome equation estimates milk income as a function of various household characteristics, the CF dummy variable, and the inverse Mill ratio (IMR). The IMR, calculated from the selection equation, adjusts the outcome equation for selection bias associated with the fact that contract farmers and independent farmers may differ in unobservable characteristics. I implement this analysis with maximum likelihood estimation. The results of the treatment effect model are presented in Table IV. The selection equation, which predicts participation in a contract farming, gives results quite similar to those of the probit model presented in Table II.

Likewise, the results of the outcome equation, which predicts milk income, are very similar to those of the OLS model in Table III. But statistically significant of some variables has increased in the selection equation. In particular, the distance to paved road now has become the predictor of contract participation at the 5% level. Moreover, the coefficient on the contract variable in this model (17330.7) is substantially higher than the contract coefficient in the OLS model (4475.5). At the bottom of Table IV, the parameter “athrho” is the correlation between the error terms in the selection and the outcome equation. The fact that this parameter is statistically significant implies that there is

selection bias, so it is best to estimate milk income using the treatment effect regression model. In other word, the estimation of the ordinary regression model underestimated this effect and there was the effect of an unobservable variable.

TABLE IV: TREATMENT EFFECT MODEL OF MILK INCOME

Variable	Coefficient	S.E.
<i>Selection equation</i>		
Dependent variable: Contract participation dummy		
Age of head	-0.048***	0.014
Sex of head	0.630	0.539
Education of head	0.066	0.166
Household size	-0.093	0.096
Farm size	0.010	0.017
Family labor	0.020	0.263
Credit constraint	-0.033	0.270
Experience	0.032*	0.018
Share of well-bred	0.603*	0.309
Electric milker	0.343	0.356
Hired labor	1.200***	0.331
Member of cooperation	0.117	0.392
Constant	0.190	1.058
Distance to paved road	-0.008	0.023
<i>Outcome equation</i>		
Dependent variable: Household milk income		
Age of head	57.60	138.97
Sex of head	-1440.2	4017.90
Education of head	-1248.42	1347.25
Household size	-204.40	767.21
Farm size	1420.27***	153.88
Family labor	1293.75	2018.62
Credit constraint	-2179.19	2218.24
Experience	-177.93	148.78
Share of well-bred	-7745.17***	2790.79
Electric milker	11222.83***	3271.59
Hired labor	-85.41	3883.59
Member of cooperation	-451.40	3184.60
Constant	5701.91	9028.27
Contract farming	17330.74**	7203.14
Athrho	-0.74*	0.44
LR test of independent equations		
Chi2(1)	1.66	
Prob> chi2	0.19	
Number of observations	144	

Note: \* Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

## V. CONCLUSIONS

In summarizing the results of this study: First, the probit analysis of our dairy farm household survey in Mongolia suggests that there is some selection (or self-selection) of contract farmers but it is by location (the nearest paved road), by age of head and by farming equipment rather than by farm size or level of education. Thus, there does not seem to be a bias toward larger farmers in these contract farming. Furthermore, the results suggest that contract farmers can be distinguished statistically from non-contracting farmers in the measure of asset specificity (the share of the well-bred cows, usage of electric milker, and hiring labor) as well as it is a strong predictor of participation in the contract farming. The reason the households with more farming equipment and hired labor favor the contract farming may be because it reduces transaction costs associated with the hold-up problem. Second, the result of regression of milk income by OLS

suggests that the contract farming significantly increases the milk incomes of contract farmers. Furthermore, the treatment effect regression model suggests that there is selection bias caused by unobserved differences between contract and non-contract farmers such as industriousness or intelligence. Finally, one implication of these results is that public policy should support the establishment and maintenance of contract farming, particularly where it involves small-scale farmers. This support could take the form of establishing a clear legal framework for contracts between farmers and agribusiness firms, helping firms identify potential contract farmers.

#### REFERENCES

[1] C. D. Silva, "The growing role of contract farming in agri-food systems development: Drivers, theory and practice," *FAO, Agricultural Management, Marketing and Finance Service*, Rome, 2005.

[2] T. Reardon and C. P. Timmer, "Transformation of markets for agricultural output in developing countries since 1950: How has thinking changed?" *Handbook of Agricultural Economics*, vol. 3, pp. 2807–2855, 2007.

[3] C. Eaton and A. Shepherd, *Contract Farming; Partnerships for Growth*, 2001.

[4] H. Wang, P. Moustier, N. Thi, and T. Loc, "Economic impact of direct marketing and contracts: The case of safe vegetable chains in northern Vietnam" *Food Policy*, vol. 47, pp. 13–23, 2014.

[5] J. F. M. Swinnen, *The Dynamics of Vertical Coordination in Agrifood Chains in Eastern Europe and Central Asia: Implications for Policy and World Bank Operations*, 2005.

[6] P. Simmon, "Overview of smallholder contract farming in developing countries," *ESA Working Papers 289109*, 2002.

[7] N. Minot and L. Ronchi, "Contract farming: Risks and benefits of partnership between farmers and firms," *Viewpoint*, no. 344, The World Bank Group, Washington, DC, 2014.

[8] S. Singh, "Contracting out solutions: Political economy of contract farming in the Indian Punjab," *World Development*, vol. 30, no. 9, pp. 1621–1638, 2002.

[9] D. Tuvshinjargal, *The Survey of Financial Structure in Farm with Producing Perishable Products*, Ulaanbaatar, 2017.

[10] M. F. Bellemare and J. R. Bloem, "Does contract farming improve welfare? A review," *World Development*, vol. 112, pp. 259–271, 2018.

[11] S. Jaffee, *Exporting High-Value Food Commodities*, 1992.

[12] B. Minten, L. Randrianarison, and J. F. M. Swinnen. 2005. Supermarkets and farmers in developing countries: Evidence from Madagascar. [Online]. Available: [http://www.fao.org/uploads/media/Supermarkets\\_%20International%20Trade%20and%20Farmers%20in%20Developing%20countries\\_%20Evidence%20from%20Madagascar.pdf](http://www.fao.org/uploads/media/Supermarkets_%20International%20Trade%20and%20Farmers%20in%20Developing%20countries_%20Evidence%20from%20Madagascar.pdf)

[13] A. K. Birthal, P. S. Narrod, and W. Bank, "Improving farm-to-market linkages through contract farming: A case study of smallholder dairying in India," *IFPRI Discussion Paper*, vol. 00814, 2008.

[14] O. E. Williamson, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, Free Press, 1985.

[15] L. Dries and J. F. M. Swinnen, "The impact of interfirm relationships on investment: Evidence from the Polish dairy sector," *Food Policy*, vol. 35, no. 2, pp. 121–129, 2010.

[16] M. Warning and N. Key, "The social performance and distributional consequences of contract farming: An equilibrium analysis of the Arachide De Bouche program in Senegal," *World Development*, vol. 30, no. 2, pp. 255–263, 2002.

[17] L. Dries and J. F. M. Swinnen, "Foreign direct investment, vertical integration, and local suppliers: Evidence from the Polish dairy sector," *World Development*, vol. 32, no. 9, pp. 1525–1544, 2004.

[18] J. Macdonald, P. J. Ahearn, M. Banker, W. Chambers, C. Dimitri, and L. Southard, *Contracts, Markets, and Prices*, U.S. Department of Agriculture Organizing the Production and Use of Agricultural Commodities, 2004.

[19] C. Dolan and J. Humphrey, "Governance and trade in fresh vegetables: The impact of UK supermarkets on the African horticulture industry," *Journal of Development Studies*, vol. 37, no. 2, pp. 147–176, 2000.

[20] M. Maertens and J. F. M. Swinnen, "Trade, standards, and poverty: Evidence from Senegal," *World Development*, vol. 37, no. 1, pp. 161–178, 2009.

[21] N. Key and D. Runsten, "Contract farming, smallholders, and rural development in Latin America: The organization of agro-processing firms and the scale of outgrower production," *World Development*, vol. 27, no. 2, 1999.

[22] J. Huang and T. Reardon, "Patterns in and determinants and effects of farmers' marketing strategies in developing countries. Synthesis Report – micro study," *Regoverning Markets*, 2008.

[23] J. Wilkin, D. Milczarek, J. Falkowski, and A. Malak-Rawlikowska, "Agrifood sector series: The dairy sector in Poland," *Regoverning Markets*, 2006.

Copyright © 2021 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).



**Tuvshinjargal Dagiimaa** graduated from Mongolian State University of Education with the BA in economics and statistics in 2005, then graduated with the MA in economics from National University of Mongolia in 2007. In 2020, He obtained his Ph.D in business administration from the University of Finance and Economics.

He has been working at the University of Finance and Economics since 2007. From 2006 to 2008, he was one of the participants of regional seminar for excellence in teaching: Institutions and Public policy sponsored by OSI. Furthermore, he has been selected by The Ronald Coase Institute to participate on the workshop in institutional analysis was co-organized by the Tel Aviv University in Israel at the December of 2015.

His major research field was macroeconomics, but has been focused on new institutional economics, and the supply chain governance since 2015. Among the several the papers he has written, the best-known include "Time inconsistency and Central bank independence in Mongolia," *Proceeding of Conference of UFE*, 2010.